

SUBSTITUTE SPECIFICATION

TITLE OF THE INVENTION

METHOD AND DEVICE FOR MAPPING CONTROL CHARACTERS

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The invention relates to a method and a device for mapping control characters.

2. Description of the Related Art

[0002] In the mobile use of a computer, for example a PDA (Personal Digital Assistant) or a notebook, it is possible in just the same way as with a stationary computer to access the Internet, for example via a GSM wireless interface. The information on the Internet is usually offered in the form of Hypertext Markup Language (HTML), which has a multiplicity of control characters, known as "tags", for special display. Furthermore, there is a clear trend toward more and more such tags, with ever increasing functionality.

[0003] Access to a computer network such as the Internet via a wireless interface has the disadvantage that the wireless interface does not maintain the same bandwidth for data exchange, as is the case in a fixed network. This effect of the actually too small bandwidth is additionally exacerbated by the numerous multimedia functionalities of the HTML pages on the Internet, which provide a varied, full and attractive presentation at the expense of an adequately high data transmission rate.

[0004] A mobile computer, which for example calls up such multimedia displays via a wireless interface, requires loading times which are usually likely to be unacceptable to a user. For example, there are numerous HTML pages (also: home pages, Internet pages) which comprise several 100 Kbytes of data to be loaded. With a transmission rate of, for example, 9600 bits/s, this leads to loading times with which economical working is scarcely possible.

SUMMARY OF THE INVENTION

[0005] An object of the invention is to ensure in the case of mobile computers or a low bandwidth of a transmission channel an efficient mode of working, in particular when accessing a computer network from the mobile computer.

[0006] To achieve the object, a method for mapping control characters in which the control characters are elements of a hypertext markup language is specified. First data are read in and predetermined control characters are ascertained in the first data. The control characters are used to map the first data onto second data according to a predetermined parameter.

[0007] In this case, it is particularly advantageous that the mapping of the data allows a mobile computer, for example a PDA or a notebook, which is preferably connected via a wireless interface to a computer network, for example the Internet, to make efficient use for the mobile computer of the available bandwidth or the available resources (hardware, software) on the mobile computer.

[0008] The predetermined parameter may provide, in particular, information on the hardware used in the mobile computer (for example resolution of the display, details on color information, available plugins). This parameter is consequently used with preference to adapt the available bandwidth to the special capabilities of the respective mobile computer.

[0009] It should be noted here that the mobile computer is preferably connected via a wireless interface to a computer network, the a wireless interface generally having a lower bandwidth than a comparable fixed network connection. The computer network may be, in particular, the Internet. On the mobile computer there runs in particular a program for displaying information, for example what is known as an Internet browser (browser for short). With this browser, information, which is typically hypertext markup language or HTML, can be displayed. In particular, the mobile computer receives the information from a (usually stationary) computer (representative of the computer network), referred to as a server. This server may alternatively also be what is known as a proxy server. The information is sent from the server in a format which can be read by the mobile computer (for example as an HTML document). The diverse possibilities of HTML displays usually require an adequately "fast" connection for an acceptable rate of display, that is a transmission channel which has a certain minimum bandwidth between the mobile computer and the server. An ISDN connection with 64 kbits/s, or the analog

equivalent according to the V.90 standard (transmission rate: up to 56 kbits/s), is customary for use of the diverse HTML display capabilities.

[0010] To be able also to work on the mobile computer with the information actually of interest (possibly with a restriction in the diversity of multimedia displays), an adequately fast display is necessary, in particular the time period between requesting the information and the display. This fast display is ensured by the method described above, in that a type of display and of transmission specifically suited to the capabilities of the mobile computer is ascertained in particular on the basis of the predetermined parameter (which takes into account the hardware of the mobile computer or the possible transmission rate) and is used.

[0011] The scenario described, with a mobile computer and fixed network computer which exchange data via a wireless interface, is presented by way of example for illustration purposes. Alternatively, for example, the mobile computer may also be a stationary computer and the interface may be a fixed network connection, wired or wireless. The computer network may also be any desired network.

[0012] Within a development, the second data may represent the empty set.

[0013] One development is that the control characters are HTML tags. In this case, the HTML tags preferably have a structure such that the following applies:

<TAG> ... </TAG>

where "TAG" denotes a dummy for a desired HTML tag, the angle brackets emphasize the HTML tag and the oblique "/" identifies the end of the control character sequence. Information, indicated by "...", is usually contained between the control characters.

[0014] Another development is that the parameter is dynamically ascertained. In this case, certain requirements or capabilities of the mobile computer or server (analogous to the above example) are dynamically investigated. In particular, new display capabilities on the mobile computer, caused for example by exchange of a display, can be taken into account.

[0015] One refinement is that the mapping of the control characters is carried out onto a subset of all the possible control characters.

[0016] Another refinement is that the control characters are mapped with at least one of the following mechanisms taken into account:

a) Identical mapping:

The control character belongs to the known control characters and is passed on unchanged. Display takes place on the mobile computer.

b) Extraction of information:

The control character is unknown or is not to be displayed. However, the information contained is to be displayed, preferably transparently (that is without further control information).

c) Conversion to similar control characters:

The control character is unknown or is not to be displayed, reverting instead to an alternative control character, preferably with a similar effect.

d) Erasure:

The control character is unknown or is not to be displayed; information possibly contained is also not of interest: control character/s and information (assigned to the control character/s) are erased.

e) Extraction of alternative information:

The control character is unknown or is not to be displayed; however, information contained comprises alternative information which is to be displayed, possibly also with special marking.

[0017] Another development is that the mapping of the control characters takes place on a mobile computer, on an associated server or a proxy server.

[0018] It is also a development that a degree of scaling for detailing of the mapping is determined by the predetermined parameter. With this degree of scaling, an adaptation to a rate of display found to be acceptable for the user is made possible with regard to the bandwidth available. For instance, the user may have as many features of the hypertext markup language as possible displayed to him, as long as the rate of display is found to be adequate.

[0019] With the method described, it is possible to respond flexibly to different control characters, including those newly added, and to agree on a specific adaptation of the mapping for each control character or a group of control characters. Specifically in the case of HTML and its successors, there are constantly new features and special formatting possibilities, the

mapping, conversion or removal of which are of significance in particular for the display on a mobile computer.

[0020] Also specified for achieving the object is a device for mapping control characters provided with a process unit which is set up in such a way that

- a) the control characters are elements of a hypertext markup language;
- b) first data can be read in;
- c) predetermined control characters can be ascertained in the first data;
- d) the control characters can be used to map the first data onto second data according to a predetermined parameter.

[0021] This device is suitable in particular for carrying out the method according to the invention or one of its developments explained above.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] These and other objects and advantages of the present invention will become more apparent and more readily appreciated from the following description of the exemplary embodiments of the invention, presented and explained below with reference to the drawing, in which:

Figure 1 is a flowchart of a method for mapping control characters;

Figure 2 is a block diagram with mapping alternatives;

Figure 3 is a block diagram of a mobile computer and server;

Figure 4 is a block diagram of a processor unit.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0023] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout.

[0024] Figure 1 is a flowchart of a method for mapping control characters which are elements of a hypertext markup language. In block 101, first data are read in; in block 102, control characters are ascertained in the first data. In block 103, the control characters found are used to map the first data onto second data according to a predetermined parameter. In this case, the second data may be empty. The second data may in turn also comprise control characters, but the control characters contained in the second data are understood by the computer on which the data are prepared (for example on a mobile computer).

[0025] Figure 2 is a block diagram with alternative possible ways of realizing the mapping of the control character or the control characters 201. As already mentioned, the mapping can be carried out in various ways. The possibilities based on HTML notation are illustrated below.

- a) Identical mapping, see block 202:

The control character belongs to the known control characters and is passed on unchanged. Display takes place on the mobile computer.

Example:

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<A HREF="http://www.test.de"> A link </A>  
remains unchanged
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- b) Extraction of information, see blocks 203, 204:

The control character is unknown or is not to be displayed. However, the information contained is to be displayed, preferably transparently (that is without further control information).

Example:

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<DFN> Any text <DFN>  
becomes "any text".
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- c) Conversion to similar control characters, see block 206:

The control character is unknown or is not to be displayed, reverting instead to an alternative control character, preferably with a similar effect.

Example:

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2<SUP>nd</SUP>
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is converted to

2<IT>nd</IT>.

d) Erasure, see block 207:

The control character is unknown or is not to be displayed; information possibly contained is also not of interest: control character/s and information (assigned to the control character/s) are erased.

Example:

<SCRIPT>function...</SCRIPT>

is deleted completely.

e) Extraction of alternative information, see blocks 203, 205:

The control character is unknown or is not to be displayed; however, information contained comprises alternative information which is to be displayed, possibly also with special marking.

Example:

<IMG="http://www.test.de/test.gif" ALT="A test">

becomes " ".

[0026] In Fig. 3, a scenario comprising a mobile computer 301 and a fixed station (server) 302 is represented. The mobile computer 301 transmits the predetermined parameter, which scales the mode of the adaptation of the control characters, that is, adapts it specifically to the hardware of the mobile computer 301 and possibly the bandwidth of the communication interface 306, to the server 302 by the wireless interface 305, 306, 304. Alternatively, the adaptation to the bandwidth of the communication interface may also take place on the server 302 side (the parameter is accordingly predetermined there). The server 302 is a representative of a computer network, indicated by the Internet 303. The communication between the mobile computer 301 and the server 302 takes place via the communication interface 306 with the parameter taken into account, the requirements and capabilities of the mobile computer 301 and of the communication interface 306 specifically being taken into account.

[0027] In Fig. 4, a processor unit PRZE is represented. The processor unit PRZE comprises a processor CPU, a memory SPE and an input/output interface IOS, which is used in different ways via an interface IFC: an output is made visible on a monitor MON and/or is output on a printer PRT via a graphics interface. An input takes place via a mouse MAS or a keyboard TAST. The processor unit PRZE also has a data bus BUS, which ensures the connection of a memory MEM, the processor CPU and the input/output interface IOS. Furthermore, additional components, for example additional memories, data storage units (hard disk) or scanners, can be connected to the data bus BUS.

[0028] The invention has been described in detail with particular reference to preferred embodiments thereof and examples, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention.